



# **SOURCE DATA EVALUATION**

**Study of Factors Related to Physicians' Prices**



**Pennsylvania  
Blue Shield**



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Research Memorandum M-419-12

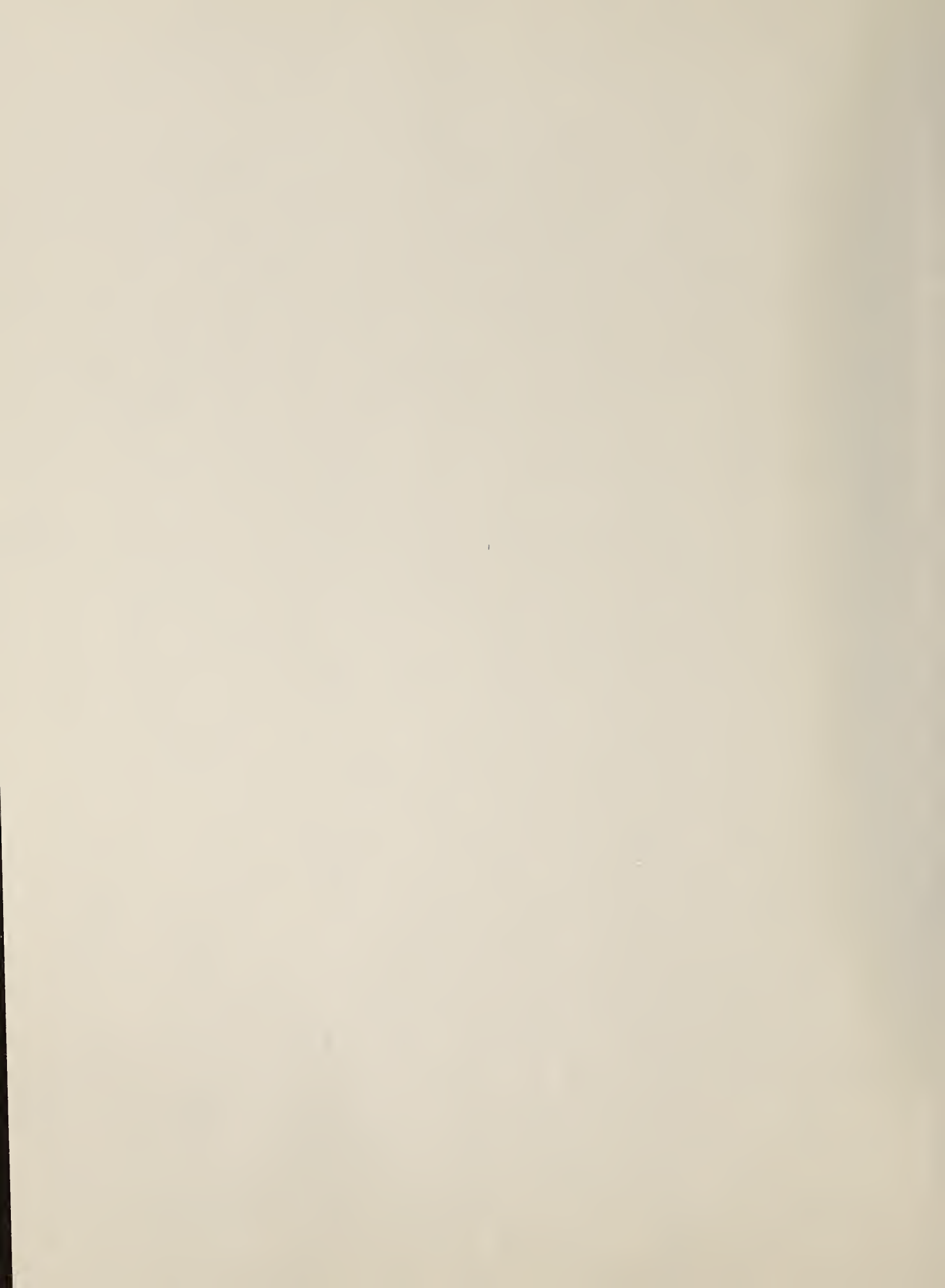
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## SOURCE DATA EVALUATION

### INTRODUCTION

This project is concerned with physicians' pricing practices and related considerations in the physicians' services market, as exhibited by Pennsylvania physicians in claims for reimbursement submitted to Pennsylvania Blue Shield (PBS). Price and quantity data for use in these studies have been extracted from claims transaction history files created in connection with claims processing operations at PBS. Services delivered under both Medicare Part B and regular Blue Shield benefit coverages are included.

A major part of the work in this project is being pursued in a cross-sectional framework, using data for calendar year 1975. Forty-six representative procedures (expanded from an original list of forty-four) have been chosen as the focus for this cross-sectional investigation, as described and discussed in previous project reports.<sup>1,2</sup> For completeness in the context of this present report, the selected procedures are listed again here in Appendix A. An individual physician's price and quantity data for each of these selected procedures is included in the study data base only if the physician has performed the given procedure and reported a claim to PBS at least ten times during the course of the year (1975).

Another major facet of the work in this project is a longitudinal analysis of physicians' pricing behavior, using price and quantity data

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<sup>1</sup> Procedure Sample Selection for Study of Factors Related to Physician Prices, PBS Research Memorandum, April 29, 1977.

<sup>2</sup> Primary Data Bases for Study of Factors Related to Physicians' Prices, PBS Research Report R-419-10, October 1979.





derived from annual PBS claims experience files for 1973 through 1978.

Again, this includes both Medicare Part B and regular Blue Shield experience data. The longitudinal analysis concentrates upon twenty-three selected procedures (a subset of the forty-six selected for 1975 cross-sectional analysis), as identified in Appendix B. Data for the selected procedures are included in the experience base for a given major line of business (i.e., Medicare B or regular Blue Shield) only for individual physicians who: (a) reported a given procedure to PBS at least ten times in 1975, and (b) have continuous claims experience in that same procedure spanning all six longitudinal study years, 1973-1978.

Data bases for Medicare Part B experience and for regular Blue Shield experience have been separately developed and maintained for purposes of the studies being conducted in this project. All of the data selection and data evaluation criteria discussed in this report are applied independently for each of these two major lines of business. In general, the various descriptive and analytic studies conducted in this project also are applied separately and independently for each of the two major lines of business. Results obtained from the two parallel sets of analyses subsequently are compared, however, and are evaluated relative to one another.

Clearly, in a project of this nature, it is important that the price and quantity data contained in the study data bases be of the best possible quality. This report addresses and evaluates the quality of the physician services price and quantity data base extracted from PBS claims experience files for these purposes. The primary emphasis is to assure that the included price data, in particular, are valid and correct to the greatest extent possible. The data quality control efforts described here were pursued primarily in the context of the 1975 cross-sectional study data base. It is assumed that the findings and recommended quality control



procedures are generally applicable in relation to similar data for the additional years included in the longitudinal study.



## DATA QUALITY PROBLEMS AND INVESTIGATIONS

Using the selection criteria highlighted in the preceding section, detailed price data for somewhat more than 11,000 individual physicians were captured for use in this study. Each individual physician's pricing behavior was described and summarized in terms of several parametric and nonparametric statistics calculated for each procedure for which the physician is represented in the base of selected claims experience -- e.g., for the given procedure, the physician's minimum and maximum prices, mean price, median price, skewness, standard deviation, and coefficient of variation of his price distribution, and other measures.

These representative values for each individual physician then were used as the basis for calculating population statistics describing the aggregate pricing behavior of the overall population of physicians sampled, or of physicians in various cohorts, for specific procedures. For a given population or cohort of physicians, this would include the mean, standard deviation, skewness, range, minimum, maximum, and other characteristics of the distributions formed by collecting the various representative statistics developed to describe pricing characteristics and behavior at the individual physician level. These second level statistics included, for example, the mean of the individual physicians' mean prices, the mean of the individual physicians' medians, the mean of the individual physicians' coefficients of variation, the standard deviation of the individual physicians' means, the standard deviation of the individual physicians' medians, the range of the individual physicians' medians, and so on.

Examination and evaluation of the resulting condescriptive statistical summaries initially revealed certain unusual and disturbing behaviors for



some of the statistics. Anomalous behaviors detected in certain instances reflected the apparent existence of statistical outliers and aberrant distributions, and suggested the probable inclusion of some unknown amount of invalid and/or spurious source data. For instance, prices for surgical services for appendectomy were indicated to run as high as \$1,850, where the mean of the means for this service was approximately \$137; D&C ran as high as \$1,450, where the mean of means was \$131; hysterectomy to a maximum of \$6,750, with a mean of \$489; and proctosigmoidoscopy to a maximum of \$685, with a mean of approximately \$27. For proctosigmoidoscopy, the mean of the individual physicians' coefficients of variation was 0.118, but at least one physician had a coefficient of variation as high as 2.458. Needless to say, these are some very implausible high-side statistics; and they clearly signal the inclusion of some bad data. While the data base extracted from PBS claims experience files to support these studies was confidently felt to be of better quality than any other known data base of physician price information at this level of detail, it obviously was not as good as had been desired and expected. Consequently, supplemental investigations (above and beyond the original project work plan) were undertaken to isolate, identify, analyze and eliminate the invalid and spurious data elements that apparently had found their way into the study data base.

In the first stage of this investigation, claims records associated with the tails of the price data distributions were identified and isolated, on the assumption that this is where the great bulk of incorrect or questionable data would be found. This involved segregating and developing computer-generated detail listings of claim transaction records indicating unusually high or unusually low physician charges for the service rendered. From the unique claim numbers indicated in these records, a sample of claims was selected, and the original claims documents associated with these records





were retrieved in hard copy from the company's permanent microfilm files. These original claim copies were examined closely in comparison with the information in corresponding computer records. The examination revealed a significant number of claims records in the computer system that incorrectly represented their source transactions. Specific problems encountered included miscoded information (e.g., wrong procedure code), data entry errors (e.g., transpositions, or data entered in the wrong character fields), inclusion of records with action codes indicating some irregularity in the handling and/or disposition of the original claim, supplemental payments related to an earlier claim appearing as new claims, and others.

While this detailed sample analysis of original hard copy claim documents served to explain most of the observed irregularities in the data distributions, it was not very helpful from the standpoint of providing methods and procedures to comprehensively ferret out and correct and/or eliminate the bulk of the remaining problems in the data base. The investigative processes employed for data quality assessment up to this point had entailed extensive, tedious, and extraordinarily time-consuming manual effort. Due to the immense size of the overall data base, it was not at all feasible to continue with the same or similar methods to clean up the entire data base. To achieve this objective more efficiently and expeditiously, further supplemental research was conducted to identify and develop appropriate data edits and screens that could be applied by computer to assure a satisfactory degree of data quality control. The resulting data screens and edit routines are described and discussed in the following section.



## DATA SCREENS AND EDITS

Based upon an extensive analysis of each of the physician procedures selected for inclusion in the cross-sectional studies, a series of computer based data screens and edits were devised to assure the quality of data obtained from both Medicare B and regular Blue Shield lines of business. These analyses included consideration of possible variations in definitional content for each procedure, characteristics and conditions of clinical usage, associated price data distributions and characteristics, and applicable guidelines and practices employed in claims administration. These edits removed anomalous data arising from errors in coding and data entry by screening out records for claims with places of treatment, physician specialty codes, service quantities or billed charge levels that would be inconsistent with the specific procedure indicated. In addition, records including action codes entered in conjunction with the claims processing and payment operation were screened out of the data base. Action codes are used in claims processing at PBS to identify atypical claims -- such as those involving unusual clinical circumstances -- for which it may be reasonable to assume that the pricing indicated on the claim record also could be atypical.

Specific data screens and edits that were applied in order to filter out questionable and erroneous data are identified and discussed below. The edit routines were applied sequentially, in the order presented below.

### 1. Type-Service and Procedure Edits

The PBS procedure coding and terminology system employs a five-digit numerical code to identify the specific procedure performed by the physician, along with a two-digit prefix code to identify the generic type of service



involved. In some cases, the specific service performed is differentiated not by the five-digit procedure code, but by the associated two-digit type-service code. For instance, a procedure code occurring with type-service code "22" would indicate definitive surgery, while the same procedure code occurring with type-service code "42" would indicate the associated anesthesia service.

Some of the procedures selected for study in this project are in fact found to occur in conjunction with various types of service and type-service codes. X-ray procedure codes, for example, are used with a "55" type-service code to indicate a procedure performed as a result of injury (traumatic), whereas type-service code "54" is used to indicate x-ray procedures performed in cases related to disease or chronic disorders (diagnostic). Among the procedures selected for study here, the knee x-ray was the only x-ray service which might commonly and validly be expected to occur with both types of service. Traumatic x-rays for the other x-ray procedures included in the selected procedure list represented only a negligible proportion of the data and were felt to be indicative of unusual circumstances, particularly since most of these procedures were fluoroscopies. For x-ray procedures other than the knee, only records indicating type-service "54" (diagnostic) were accepted.

Dilation and curettage (D&C) also can occur with various types of service. When the procedure is performed for diagnostic purposes, type-service code "25" is used. When the procedure is performed as definitive surgery, type-service code "22" is used. The associated anesthesia services are indicated by type-service codes "45" and "42", respectively. The PBS procedure coding system uses three different five-digit procedure codes to differentiate three distinctly different variations of the D&C procedure,





one of which is exclusively diagnostic. The specific D&C procedure code selected for the procedure sample in this project was the most frequently occurring of the three, and is felt to be most consistent in usage as an indicator of a definitive, therapeutic surgical procedure. Records indicating the selected D&C procedure along with a "diagnostic" service code for either surgery or anesthesia were screened out of the data base.

These edits apply only to the PBS regular Blue Shield experience base. The usage of type-service and procedure codes in PBS Medicare B operations is slightly different from the usage in private business (Blue Shield) claims processing; and the potential problems addressed by this edit do not occur for Medicare.

## 2. Action Code Edit

In the processing of regular Blue Shield business claims, action codes are used to indicate unusual circumstances, to flag cases of multiple procedures reported with only a single combined charge, and to keep questionable billed charge data out of the calculation of a provider's profile. Most action codes cause the claim to deviate from the usual claim processing sequence and to suspend for manual pricing. In this event, neither the billed charge nor the payment data should be considered typical or validly representative. Since an action code always indicates some sort of unusual circumstance, which could be reflected in unusual pricing characteristics, all action-coded data records were screened out of the project data base.

Action codes are used only in PBS regular Blue Shield claims processing. In Medicare B claims processing, the closest counterpart to "action code" would be "pricing status." In this study, only transaction data from Medicare records with pricing code "P6" are included in the data base. In the Medicare B system used at PBS, this code indicates "no unusual circumstances."





The following is a brief summary of action codes causing data to be deleted from the data base of regular Blue Shield experience.

- "A" - This action code is used to remove the provider's billed charge from profile (usual and customary charge) calculations. It occasionally is used to indicate multiple unrelated procedures.
- "1-4" - Claims with these action codes automatically reject because they are indicative of routine physical examinations, which are not normally covered by PBS benefit packages.
- "5" - This action code is used mainly when there are multiple unrelated procedures reported with only a single comprehensive charge.
- "6" - This action code is used to indicate the addition of modifying or physical status units in the administration of general anesthesia. Many times these additional units are denied payment, and in order to facilitate automatic pricing, they are not added to the anesthesia time units displayed in the service field. This results in an inaccurate average billed charge per unit of service.
- "7" - This action code is used to reflect multiple related procedures reported with a single comprehensive billed charge.
- "8" - The use of this action code has been inconsistent. PBS periodically has been awarded the contract to process FEP low option claims. At these times, this code is used to indicate an FEP low option claim. At other times, this code has had myriad other uses, such as to indicate unrelated surgeries for FEP high option claims.



"9" - This action code is used when a provider indicates a reduced charge due to professional courtesy or an unusual situation. It prevents the provider's charge from being entered into the profile calculations.

### 3. Physician Specialty Edit

To remove data that could confidently be assumed to represent claims for services performed by erroneously coded or otherwise questionable providers, records indicating the following specialty/vendor codes were excluded:

- 00 - Unknown
- 25 - General Dentistry
- 31 - Podiatry (DSC)
- 32 - Dental Surgery
- 33 - Endodontist
- 34 - Orthodontist
- 35 - Chiropractor
- 36 - Pedontist
- 37 - Periodontist
- 38 - Prosthodontist
- 54 - Surgical Equipment
- 57 - Optometrist
- 58 - Optical Supply
- 59 - Ambulance Service
- 61 - Voluntary Ambulance Service
- 63 - Portable X-ray Carrier
- 65 - Physical Therapist
- 87 - Rental Supplier
- 88 - All Other Suppliers

All of the above are providers other than M.D. or D.O. physicians; and, for the most part, they would not be eligible for payment for any of the sample procedures. The studies in this project consider only services provided by Doctors of Medicine (M.D.), Doctors of Osteopathy (D.O.), or independent laboratories.

An additional specialty edit excluded surgical procedures performed by anesthesiologists. An examination of 1975 Medicare and regular Blue Shield data showed that there was no experience for anesthesiologists performing



major definitive surgical procedures such as hysterectomy and cholecystectomy. There was some evidence that anesthesiologists occasionally perform arthrocentesis and some of the less extensive surgical procedures. However, this occurs very infrequently; and deletion of anesthesiologists' claims for these minor surgeries was felt to have little impact in terms of significant data loss for any of the selected procedures.

The necessity for removing anesthesiologist providers from the data base of surgical procedures derives from the fact that anesthesia procedures frequently are miscoded as surgical procedures. If such errors are not corrected, average charges calculated for the affected surgical procedures appear artificially low.

#### 4. Service Quantity Edits

Each claim transaction record contains a service quantity field, showing how many replications or units of the same procedure were delivered for the billed price indicated on the claim. Some physician procedures, such as hospital visits, commonly occur in multiples -- i.e., ordinarily, your physician will visit you to check your progress more than once during an episode of illness as a hospital inpatient. The common practice then is to report this on a claim containing a single line item for each distinctly different kind of service or visit, with the number of times each service was delivered/performed being indicated in the "services" field. The majority of procedures, however, occur most often as a single service claim or line item. It is inherent, for instance, that many surgical procedures can be done only once. If the claim line item (or transaction record) shows multiple services for the reported procedure, then the price per service must be determined by dividing the billed charge for that line item by the indicated number of services.



A common source of error in claims records is an incorrect entry in the service quantity field. Usually, this occurs as a simple data entry mistake; but the effects on average price statistics can be devastating. For example, if the digit "1" is entered two character spaces to the left of the proper place in the services field for a single service line item, subsequent statistical summaries will perceive this as 100 services, each priced at 1/100 of the actual price for the service. It is prudent, therefore, to pass the data base through an edit routine designed to detect and eliminate transaction records with obviously incorrect or seriously questionable service counts. Nearly all physician procedures can be determined to have logical, practical, or intuitively sensible limits to the number of services that can reasonably be associated with a single line item on a claim transaction.

Following is a list of those sample procedures used in this study for which claim records might normally be expected to show a single service per line item. For most procedures, well over 95 percent of data in the distributions of service quantities were single service line items. For procedures such as hysterectomy or cholecystectomy, it should be readily apparent that the procedure could occur only once. Records indicating more than one service per claim line item for any of the following procedures were screened out and deleted from the data base:

- Excision of breast cyst
- Arthrocentesis
- Colles fracture
- Aortocoronary saphenous vein bypass
- Tonsillectomy
- Appendectomy
- Proctosigmoidoscopy
- Cholecystectomy
- Herniorrhaphy
- Prostate (TUR)
- D&C
- Hysterectomy





Laminotomy  
Lens extraction  
Vaginal delivery  
Chest x-ray  
Upper GI  
Barium Enema  
Cholecystography  
Initial hospital visit  
EKG  
EEG  
Urinalysis  
Cholesterol blood  
Fasting blood sugar  
CBC  
Comprehensive consultation

Listed below are those selected procedures for which it is customary to find multiple-service line items. An edit routine sets the maximum allowed number of services per line item at 35 for medical care. Any records exceeding this for the following procedures are deleted:

Brief office visit  
Intermediate office visit  
Intermediate home visit  
Brief hospital visit  
Intermediate hospital visit

The upper limit service screen for knee x-ray was set at two services per line item. The two services screen was felt to be justified here since it is known that in many cases of traumatic injury or chronic knee disorder, the unaffected knee is x-rayed for comparative purposes. An examination of the data distributed by services per line item showed that 13 percent of the line items indicated two services.

Anesthesia service screens were handled differently than those for other types of service, since anesthesia services reflect the number of time units delivered rather than the number of times the procedure was performed. Distributions of data on services (i.e., "units") per line item were examined for each anesthesia procedure; and a practicing anesthesiologist



was consulted in order to determine the minimum and maximum number of time units typically required for performance of each procedure. The minimum screen was especially important because, if due to data entry or coding errors, no time units were entered in the service field, the claim processing system is designed to assume a value of one unit and to plug this value into the service quantity field. This default to a one unit service count destroys the validity of statistics on average charge per unit. Hence, anesthesia records with one unit service counts were deleted, except for those procedures for which a single unit of service is specifically known to be reasonable. It was felt that an upper limit for number of services per line item of anesthesia service also would be desirable. This would delete those line items with large data entry errors, as well as procedures in which the administration of anesthesia took an unusually long time, possibly indicating an atypical charge due to complicated circumstances. The anesthesia screens were as follows:

#### Service Quantity Screen

<u>Anesthesia Procedure</u>	<u>Minimum</u>	<u>Maximum</u>
Excision of breast cyst	2	8
Coronary bypass graft	8	30
Tonsillectomy	2	6
Appendectomy	2	10
Cholecystectomy	3	16
Unilateral inguinal herniorrhaphy	2	12
TUR prostate	2	12
D&C	1	6
Abdominal hysterectomy	3	16
Lumbar laminotomy	4	17
Cataract excision	2	11

#### 5. Place of Treatment Edit

For the following major surgical, obstetrical and anesthesia procedures, data reported for any place of treatment other than in-hospital were excluded from the study data base:



Aortocoronary Bypass  
Adult or Child Tonsillectomy  
Appendectomy  
Cholecystectomy  
Hernia  
TUR prostate  
Hysterectomy  
Herniated Disc  
Lens Extraction  
Vaginal Delivery  
Any General Anesthesia

Only those surgical procedures in the sample that normally are too complicated or extensive for an outpatient setting are included in this edit. The edit eliminated only a limited amount of data. Statistics for calendar 1975 show that more than 95 percent of the services recorded for these procedures occur in-hospital. Among other benefits, this edit purged the data base of claims for follow-ups to surgery which were erroneously coded as the surgical procedure itself.

Like surgery, well over 90 percent of the anesthesia procedures in the sample occurred in-hospital. Since every anesthesia procedure in the sample is for an anesthesia service related to some surgical procedure found in the surgery part of the sample, it seems reasonable to apply the same place of treatment edit to both types of service. For anesthesia performed for less extensive procedures such as D&C or breast cyst, an examination of the data revealed that, like the more definitive surgeries in the sample, most of the general anesthesia administered was in the inpatient setting. Since most physicians' offices are not equipped for the administration of general anesthesia, any charge data received for office anesthesia would be suspect.

For the diagnostic x-ray procedures, charge data from in-hospital and out-patient department places of treatment were excluded from the study. This edit was installed in an attempt to exclude miscoded professional component data from the experience base of full-service x-ray procedures.



In 1975, there were no provider flags in use at PBS to indicate which doctors were billing professional component. Therefore, the only way a claim would be coded as professional component was if it was specified on the claim. Professional component claims which were not indicated as such by the provider were coded as full service x-rays. An examination of correctly coded professional component data revealed that almost all professional component services were performed either in the inpatient setting or in the outpatient department of a hospital. This tendency for a preponderance of professional component experience to occur in the inpatient and outpatient departments of hospitals appeared to carry over to full diagnostic x-ray procedures for which the average charge per service was much lower in those two places than in other places of treatment. These low average charges were caused by contamination of full service x-ray data by improperly coded professional component claims. Removal of these places of treatment from the sample data resulted in a loss of approximately 40 percent of Medicare data and 15 percent of regular Blue Shield data for these services. Even though this is a large percentage of data, these claims can safely be assumed to represent erroneously coded professional component data.

For medical care procedures, the place of treatment specified should be the same as that mentioned in the description of service. This edit insured that all office, home, and hospital visits had an office, home, or hospital place of treatment, respectively. The place of treatment for consultation was restricted to in-hospital, since prior to the initiation of the surgical consultation program in 1976, the hospital setting was the only place of treatment eligible for payment.





## 6. Extreme and Token Charge Screens

The final edit consisted of eliminating transaction records showing extremely high or extremely low physician charges for the service performed. The purpose of this edit was to exclude probable coding errors which were not identifiable by any of the previous tests, including mis-coding of assistant surgery as surgery, minor procedures coded as more extensive procedures or vice versa, and simple data entry errors such as the misplacement of decimals in the billed charge field.

Since a primary objective of the overall study is to document and explain charge variations, it is important not to eliminate legitimate charges simply because they deviate from the mean. Therefore, the distribution of charges for each procedure was examined very carefully to choose minimum and maximum charge screens that would exclude a very small percentage of the charges (generally less than two or three percent) which clearly were extremely high or low in relation to the overall distribution. The excluded transaction records were sampled and reviewed to verify that in most cases they represented anomalous situations. Thus the major and legitimate portion of charge variation was retained in the study data base. The charge screens used for each procedure are displayed in Appendix C.



## SUMMARY EVALUATION OF DATA SCREENS AND EDITED DATA BASE

As a result of applying the edit routines described above, 123,249 services were screened out of the initial data base of regular Blue Shield claims experience, and 335,031 services were screened out of the initial Medicare Part B claims experience base extracted for the 1975 cross-sectional studies in this project. These volumes represent 7.3 percent of the services in the initially extracted Blue Shield claims experience base, and 5.9 percent of the initial Medicare Part B claims experience base. The deletions were distributed over the major types of service as indicated in Tables 1 and 2. A summary of the deletions resulting from each stage of the editing and screening sequence is given in Tables 3 and 4. In examining the figures in Tables 3 and 4, it should be remembered that the edit routines were applied sequentially, in the order listed. Records failing the edit check at any given stage were eliminated immediately, and were not subjected to any subsequent edit stage. Thus, with each successive edit stage, the effects of that stage of edit on the original overall data base will generally tend to be understated.

The data screens and edit routines evidently were effective in accomplishing the objectives for which they were designed. Extremely high and extremely low values disappeared from the physician price data distributions. As pointed out previously, a random sampling of the eliminated records and services confirmed that they were almost uniformly faulty and invalid.

On the whole, variance in the price data distributions was reduced at both the individual physician level and the physician population level. This is evidenced at the individual physician level by a substantial reduction in the means of the individual physicians' coefficients of variation. This



TABLE 1. DATA BASE DELETIONS, BY TYPE OF SERVICE,  
SELECTED 1975 REGULAR BLUE SHIELD EXPERIENCE

<u>Type-Service</u>	<u>Total Services Pre-Edit</u>	<u>Services Deleted by Edit</u>	<u>% Services Deleted</u>	<u>Remaining Services Post-Edit</u>
Surgery	240,046	34,699	14.5%	205,347
Obstetrics	41,372	766	1.9%	40,606
Anesthesia	36,352	5,917	16.3%	30,435
Diagnostic Radiology	195,725	30,388	15.5%	165,337
Medical Care	450,640	14,986	3.3%	435,654
Diagnostic Medical	303,245	6,519	2.1%	296,726
Pathology	298,313	24,155	8.1%	274,158
Consultation	115,836	5,819	5.0%	110,017
Totals	1,681,529	123,249	7.3%	1,558,280

TABLE 2. DATA BASE DELETIONS, BY TYPE OF SERVICE,  
SELECTED 1975 MEDICARE PART B EXPERIENCE

<u>Type-Service</u>	<u>Total Services Pre-Edit</u>	<u>Services Deleted by Edit</u>	<u>% Services Deleted</u>	<u>Remaining Services Post-Edit</u>
Surgery	134,775	20,759	15.4%	114,016
Obstetrics	---	---	---	---
Anesthesia	15,237	1,303	8.6%	13,934
Diagnostic Radiology	121,127	52,078	43.0%	69,049
Medical Care	4,215,159	164,336	3.9%	4,050,823
Diagnostic Medical	282,370	24,428	8.7%	257,942
Pathology	759,300	55,846	7.4%	703,454
Consultation	167,817	16,281	9.7%	151,536
Totals	5,695,785	335,031	5.9%	5,360,754



TABLE 3. DATA BASE DELETIONS, BY TYPE OF EDIT,  
SELECTED 1975 REGULAR BLUE SHIELD EXPERIENCE

<u>Edit Stage</u>	<u>Services Deleted by Edit</u>	<u>Pct. of All Deleted Data</u>	<u>Pct. of Data Deleted from Original Unedited Base</u>
Procedure Code Edit	1,367	1.1%	0.1%
Action Code Edit	65,912	53.5%	3.9%
Specialty Edit	678	0.6%	0.0%
Service Edit	7,521	6.1%	0.4%
Place of Treatment Edit	26,852	21.8%	1.6%
Charge Screen Edit	20,919	17.0%	1.2%
Total	123,249		7.3%

TABLE 4. DATA BASE DELETIONS, BY TYPE OF EDIT,  
SELECTED 1975 MEDICARE PART B EXPERIENCE

<u>Edit Stage</u>	<u>Services Deleted by Edit</u>	<u>Pct. of All Deleted Data</u>	<u>Pct. of Data Deleted from Original Unedited Base</u>
Procedure Code	0	0.0%	0.0%
Action Code	0	0.0%	0.0%
Specialty	83,634	25.0%	1.5%
Service	34,206	10.2%	0.6%
Place of Treatment	52,387	15.6%	0.9%
Charge Screen	164,804	49.2%	2.9%
Total	335,031		5.9%





statistic tends to reflect (and serve as a measure of) the amount of variability, on the average, in individual physicians' pricing practices. For 40 of the 46 selected procedures, this statistic was reduced by at least 20 percent; for 28 procedures, the reduction was at least 30 percent; for 13 procedures, there was at least 40 percent reduction; and 5 procedures had reductions greater than 50 percent.

At the population level, the coefficient of variation for individual physicians' median prices is a measure of the variability in characteristic pricing practices between and among different physicians in a population. For nearly all of the selected procedures, this statistic also tended to be smaller after the edit routines were applied, although the reduction was not nearly so dramatic as for the mean coefficient of variation.

The median prices themselves remained relatively stable in a comparison of pre-edit and post-edit price statistics. Nineteen of the forty-six selected procedures showed changes of less than one percent in the mean of individual physicians' median prices; approximately three-fourths of the procedures showed changes of three percent or less; and only two showed changes exceeding five percent (at 5.2 and 5.7 percent). Surgical, obstetrical, and anesthesia services showed a nearly uniform tendency to experience slight reductions in median price as a result of the edits. This indicates that the spurious and invalid data for these types of service tended mainly to be on the high side of the price data distributions. For all other types of service, the mean of the individual physicians' median prices went slightly upward as a result of the edits, indicating that the bad data for these types of service tended to be mainly on the low side of the price data distributions. The relative stability of these statistics in any case reflects the fact that, as expected, the median is not much affected by extreme



values -- including erroneous extreme values -- in the data distribution.

Even though the data screens and edit routines had very little influence on the values obtained for "average" -- i.e., median -- prices, they were of great value for their more significant effect on other statistics used to describe the price data distributions. The elimination of invalid outliers from the price distributions was especially valuable, since any such outliers left to remain in the data base would introduce undesirable biases; would have a potentially large error effect on the "sum of squares" calculated for the distributions (in turn inducing an adverse effect on any subsequent multivariate analyses); and would tend to make the coefficients unstable in any related multivariate analyses.

A detailed comparison of selected pre- and post-edit statistics, by procedure, for the 1975 regular Blue Shield experience base may be found in Appendix D.

An additional side effect attributable to the data edit routines is that the deletion of a large number of services caused some of the physicians in the experience sample to fall below the minimum threshold of ten services per year in a given sample procedure. Consequently, some number of doctors were dropped from the study data base, since they no longer met the minimum sample size criteria for annual number of services in a procedure. Relatively few doctors were lost, however, as also indicated (by procedure) in Appendix D.

In sum, it can be concluded that the overall data base quality was greatly improved by the applied data screens and edits. The remaining post-edit data base can be accepted as consisting of predominately good and valid data. It can reasonably be assumed that very little good data was lost while purging the bad data.



Finally, it may be noted that all of the selected procedures have proven to exhibit reasonably good statistical behavior. None of the selected procedures have had to be eliminated for erratic behavior or for any other reason.



## APPENDIX A:

### SAMPLE PROCEDURES FOR CROSS-SECTIONAL STUDIES

#### Procedure Terminology

Excision breast cyst, unilateral  
Arthrocentesis, major joint  
Colles fracture, closed manipulative reduction  
Aorto-coronary saphenous vein bypass, single  
Tonsillectomy, child<sup>\*</sup>  
Tonsillectomy, adult<sup>\*</sup>  
Appendectomy  
Proctosigmoidoscopy  
Cholecystectomy  
Herniorrhaphy, inguinal, unilateral  
Resection prostate, transurethral  
Dilation and curettage (D&C)  
Hysterectomy, total, abdominal  
Laminotomy for herniated intervertebral disc, unilateral, lumbar  
Excision of lens, unilateral, for cataract, dislocated lens, etc.  
Obstetrical delivery, vaginal, including antepartum and post partum care  
Anesthesia for aorto-coronary vein bypass  
Anesthesia for tonsillectomy, child<sup>\*</sup>  
Anesthesia for tonsillectomy, adult<sup>\*</sup>  
Anesthesia for Appendectomy  
Anesthesia for Cholecystectomy  
Anesthesia for Herniorrhaphy  
Anesthesia for TUR prostate

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\* The PBS procedure coding and terminology system differentiates between adult and child tonsillectomies. It originally was intended to combine data for all tonsillectomies for purposes of this study. However, the price statistics were found to be sufficiently different to warrant re-partitioning them.





## SAMPLE PROCEDURES FOR CROSS-SECTIONAL STUDIES (CONTINUED)

### Procedure Terminology

Anesthesia for D&C

Anesthesia for Hysterectomy

Anesthesia for Laminotomy

Anesthesia for Extraction of lens

X-ray, chest, PA and lateral

X-ray, knee, 3 or 4 views

Diagnostic radiology, upper GI

Diagnostic radiology, colon, single procedure, routine barium enema

Cholecystography

Brief office visit

Intermediate office visit

Intermediate home visit

Initial hospital visit with comprehensive history and physical examination

Brief hospital visit

Intermediate hospital visit

Electrocardiogram (EKG) with interpretation and report

Electroencephalogram (EEG)

Pathology - urinalysis

Pathology - cholesterol blood

Pathology - sugar glucose blood (FBS)

Pathology - complete blood count (CBC)

Consultation, comprehensive



## APPENDIX B:

### SAMPLE PROCEDURES FOR LONGITUDINAL STUDIES

#### Procedure Terminology

Colles fracture, closed manipulative reduction  
Tonsillectomy, child  
Proctosigmoidoscopy  
Cholecystectomy  
Herniorrhaphy, inguinal, unilateral  
Resection prostate, transurethral  
Dilation and curettage (D&C)  
Hysterectomy, total, abdominal  
Laminotomy for herniated intervertebral disc, unilateral, lumbar  
Excision of lens, unilateral, for cataract, dislocated lens, etc.  
Obstetrical delivery, vaginal, including antepartum and post partum care  
X-ray, chest, PA and lateral  
Diagnostic radiology, upper GI  
Brief office visit  
Intermediate office visit  
Initial hospital visit with comprehensive history and physical examination  
Brief hospital visit  
Intermediate hospital visit  
Electrocardiogram (EKG) with interpretation and report  
Pathology - urinalysis  
Pathology - sugar glucose blood (FBS)  
Pathology - complete blood count (CBC)  
Consultation, comprehensive



APPENDIX C:

TOKEN AND EXTREME CHARGE SCREENS

1975 Blue Shield Regular Business Data

<u>Procedure</u>	<u>Total No. of Charges</u>	<u>Low Screen</u>	<u>Pct.Chg. Below Low Screen</u>	<u>High Screen</u>	<u>Pct.Chg. Over High Screen</u>
Breast Cyst	6,909	\$ 40	3.3%	\$ 250	1.1%
Arthrocentesis	74,872	10	3.7	35	1.0
Colles Fracture	5,723	75	3.6	250	3.2
Coronary bypass	292	1,000	0.7	3,000	0.0
Tonsillectomy, child	6,909	75	1.7	250	0.1
Tonsillectomy, adult	5,080	75	1.1	250	0.4
Appendectomy	5,381	150	0.6	400	1.4
Proctosigmoidoscopy	68,670	15	1.4	50	0.7
Cholecystectomy	6,410	250	0.8	600	3.9
Unilateral inguinal herniorraphy	7,689	150	0.5	400	2.1
TUR Prostate	2,161	350	1.2	800	1.1
D&C	13,306	50	1.4	250	0.8
Abdominal hysterectomy	8,952	300	1.5	800	0.8
Lumbar laminotomy	2,575	400	1.2	1,200	2.1
Lens extraction	2,424	300	1.0	800	1.0
Vaginal delivery	40,974	150	0.6	550	0.3
Anesth. for excision of breast cyst	2,976	7*	0.8	15*	1.2
Anesth. for coronary bypass	171	7*	1.8	15	0.6
Anesth. for tonsillectomy	2,671	7*	2.5	15	0.6
Anesth. for appendectomy	2,432	7*	1.2	15	0.4
Anesth. for cholecystectomy	3,109	7*	0.5	15	0.4
Anesth. for hernia repair	3,732	7*	1.2	15	0.9

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\* Charge screens for all anesthesia procedures listed here represent upper and lower limits applied to the price per "unit" of anesthesia service.



TOKEN AND EXTREME CHARGE SCREENS (Continued)

1975 Blue Shield Regular Business Data

<u>Procedure</u>	<u>Total No. of Charges</u>	<u>Low Screen</u>	<u>Pct.Chg. Below Low Screen</u>	<u>High Screen</u>	<u>Pct.Chg. Over High Screen</u>
Anesth. for TUR prostate	1,190	\$ 7*	1.7%	\$ 15	2.3%
Anesth. for D&C	5,755	7*	1.8	15	1.4
Anesth. for hysterectomy	4,687	7*	1.2	15	0.6
Anesth. for laminotomy	1,205	7*	0.2	15	0.4
Anesth. for extraction of lens	1,438	4*	0.8	13	0.9
Chest x-ray	101,951	10	0.2	35	0.4
Knee x-ray	18,575	15	1.8	50	0.7
UGI	24,624	35	1.2	80	0.1
Barium enema	9,291	25	1.1	65	0.6
Cholecystography	13,678	25	1.4	55	0.1
Brief office visit	2,761	5	1.2	20	1.1
Intermediate office visit	3,271	7	1.3	25	0.5
Intermediate home visit	66	7	1.5	30	0.0
Initial comprehensive hospital visit	200,563	15	0.3	75	0.4
Brief hospital visit	79,524	5	1.1	20	0.9
Intermediate hospital visit	155,952	7	1.7	35	0.5
EKG	292,959	15	0.9	35	0.3
EEG	7,256	15	0.4	85	0.4
Urinalysis	72,487	2	0.8	10	0.2
Cholestrol	36,732	2	0.2	25	0.0
FBS	70,194	3	1.3	10	0.3
CBC	97,049	3	0.3	15	0.1
Comprehensive Consultation	110,235	15	0.1	100	0.1

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\* Charge screens for all anesthesia procedures listed here represent upper and lower limits applied to the price per "unit" of anesthesia service.





APPENDIX D:

COMPARISON OF SELECTED PRE-EDIT AND POST-EDIT

PHYSICIAN PRICE DISTRIBUTION STATISTICS

Procedure	Mean Median		Range of Medians		CV Medians		Mean CV		N (Doctors)	
	Pre-	Post-	Pre-	Post-	Pre-	Post-	Pre-	Post-	Pre-	Post-
Excision breast cyst	\$137.59	\$137.05	\$217.50	\$190.00	.282	.262	.202	.150	292	212
Arthrocentesis	17.79	17.71	47.00	25.00	.365	.333	.179	.110	1,180	1,034
Colles fracture	148.66	144.60	280.00	175.00	.304	.259	.268	.189	193	159
Aorto-coronary vein bypass	1,844.44	1,788.89	1,000.00	1,000.00	.178	.190	.081	.081	9	9
Tonsillectomy, child and adult	136.38	--	240.00	--	.266	--	.093	--	273	--
Tonsillectomy, child only	--	133.87	--	175.00	--	.243	--	.059	--	193
Tonsillectomy, adult only	--	149.83	--	170.00	--	.200	--	.066	--	151
Appendectomy	274.00	272.00	250.00	250.00	.188	.190	.094	.066	191	167
Proctosigmoidoscopy	26.33	26.19	145.00	35.00	.389	.329	.118	.072	990	911
Cholecystectomy	435.29	430.01	430.00	330.00	.167	.152	.092	.048	279	231
Herniorrhaphy	276.90	273.24	325.00	250.00	.201	.185	.105	.065	310	268
Resection prostate	561.05	538.39	555.00	400.00	.176	.140	.098	.063	107	84
Dilation and Curettage (D&C)	131.93	131.32	315.00	200.00	.282	.255	.207	.134	425	369



COMPARISON OF SELECTED PRE-EDIT AND POST-EDIT  
PHYSICIAN PRICE DISTRIBUTION STATISTICS  
(Continued)

Procedure	Mean Median		Range of Median		CV Medians		Mean CV		N (Doctors)	
	Pre-	Post-	Pre-	Post	Pre-	Post-	Pre-	Post-	Pre-	Post
Hysterectomy	\$488.29	\$490.83	\$550.00	\$500.00	.183	.171	.094	.052	414	310
Laminotomy	682.06	676.22	637.50	600.00	.208	.192	.097	.072	64	59
Excision of lens	542.06	527.80	650.00	400.00	.193	.145	.088	.039	126	83
Obstetrical delivery	329.10	328.95	540.00	400.00	.234	.224	.077	.054	702	689
Anesth. for excision of breast cyst	63.29	62.51	104.50	93.50	.238	.236	.213	.150	96	75
Anesth. for aorto- coronary vein bypass	435.50	404.88	248.50	141.50	.203	.170	.168	.111	6	4
Anesth. for Tonsillec- tomy, child & adult	79.50	--	128.00	--	.216	--	.128	--	117	--
Anesth. for Tonsillec- tomy, child only	--	78.06	--	70.00	--	.174	--	.101	--	68
Anesth. for Tonsillec- tomy, adult only	--	80.17	--	65.00	--	.161	--	.116	--	53
Anesth. for Appendec- tomy	107.37	104.00	170.00	92.00	.218	.164	.155	.139	87	78
Anesth. for Chole- cystectomy	133.58	133.07	180.00	169.00	.214	.208	.191	.146	87	80



COMPARISON OF SELECTED PRE-EDIT AND POST-EDIT  
PHYSICIAN PRICE DISTRIBUTION STATISTICS  
(Continued)

Procedure	Mean Median		Range of Median		CV Medians		Mean CV		N (Doctors)	
	Pre-	Post-	Pre-	Post-	Pre-	Post-	Pre-	Post-	Pre-	Post-
Anesth. for Herniorrhaphy	\$ 87.86	\$ 86.90	\$126.00	\$109.00	.229	.216	.207	.173	112	98
Anesth. for TUR prostate	98.73	97.72	124.00	117.00	.237	.217	.243	.174	42	40
Anesth. for D&C	51.38	50.32	80.00	43.00	.224	.185	.235	.160	119	98
Anesth. for Hysterectomy	142.29	141.40	189.00	168.00	.195	.183	.183	.146	119	110
Anesth. for Laminotomy	166.76	158.50	224.00	228.00	.234	.237	.165	.152	48	41
Anesth. for extraction of lens	105.26	106.39	195.00	141.00	.424	.341	.197	.170	33	28
X-ray, chest	22.92	23.39	39.00	25.00	.234	.172	.075	.039	457	423
X-ray, knee	22.81	23.43	59.00	35.00	.334	.256	.139	.100	266	245
Upper GI	45.64	47.90	70.00	45.00	.255	.184	.079	.036	218	192
Colon, barium enema	40.97	42.65	71.00	40.00	.294	.202	.067	.041	139	115
Cholecystography	32.38	34.07	48.00	30.00	.245	.171	.094	.039	189	170
Brief Office Visit	8.55	8.59	16.00	13.00	.248	.238	.074	.055	321	276
Intermediate office visit	10.20	10.27	20.00	18.00	.253	.246	.061	.046	254	239
Intermediate home visit	12.71	13.43	18.00	23.00	.476	.580	.085	.029	7	7



COMPARISON OF SELECTED PRE-EDIT AND POST-EDIT  
PHYSICIAN PRICE DISTRIBUTION STATISTICS  
(Continued)

<u>Procedure</u>	<u>Mean Median</u>		<u>Range of Median</u>		<u>CV Medians</u>		<u>Mean CV</u>		<u>N (Doctors)</u>	
	<u>Pre-</u>	<u>Post-</u>	<u>Pre-</u>	<u>Post-</u>	<u>Pre-</u>	<u>Post-</u>	<u>Pre-</u>	<u>Post-</u>	<u>Pre-</u>	<u>Post-</u>
Initial hospital visit	\$ 36.45	\$ 36.51	\$118.34	\$ 60.00	.312	.298	.096	.054	3,870	3,785
Brief hospital visit	8.46	8.37	51.08	15.00	.438	.371	.145	.075	3,092	2,982
Intermediate hospital visit	11.97	12.06	81.50	28.00	.387	.354	.151	.084	4,590	4,446
Electrocardiogram (EKG)	20.45	20.45	94.00	20.00	.237	.210	.072	.037	2,206	2,499
Electroencephalogram (EEG)	46.59	47.36	65.00	60.00	.301	.274	.128	.087	48	43
Urinalysis	3.73	3.74	19.00	8.00	.384	.343	.108	.056	797	704
Cholesterol blood	5.79	5.82	23.91	23.00	.323	.326	.081	.056	583	551
Sugar glucose blood (FBS)	4.83	4.90	13.00	7.00	.268	.252	.112	.049	1,197	1,038
Complete blood count (CBC)	6.47	6.53	13.00	12.00	.266	.270	.087	.056	1,172	1,009
Consultation	41.52	41.62	85.00	85.00	.299	.300	.094	.071	2,259	2,179







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